Sana'a University
Faculty of Engineering
Electrical Engineering Department
B.Sc. of Computer and Control Engineering

32. Template for Course Plan of Electronics 2

I. Information about Faculty Member Responsible for the Course:								
Name of Faculty Member	Asst. Prof. Dr. Abdulkafi Al-Eriany	**Office Hours**						
Location & Telephone No.		**SAT**	**SUN**	**MON**	**TUE**	**WED**	**THU**	
E-mail								

II.	Course Identification and General Information:					
1.	Course Title:	Electronics 2				
2.	Course Number & Code:	PME214				
3.	Credit hours:	C.H				Total
		Th.	Tu.	Pr.	Tr.	
		2	2	2	-	4
4.	Study level/year at which this course is offered:	Level 3- Semester 1				
5.	Pre –requisite (if any):	Electronics 1(PME113)				
6.	Co –requisite (if any):	None.				
7.	Program (s) in which the course is offered	Electrical Engineering Department				
8.	Language of teaching the course:	English & Arabic				
9.	System of Study:	Regular				
10.	Mode of delivery:	Semesters				
11.	Location of teaching the course:	Inside the University, Faculty of Engineering Electrical Engineering Department				

III.   Course Description:

This course is a continuation of Electronic Circuits 1 for advanced applications. The topics include BJTs and FETs frequency response. The course also discusses the main properties and parameters of different classes of power amplifiers including the solution of power efficiency of each class & Analog-to- Digital Converters (A/D) & Digital-to-Analog Converters (D/A). The course has an associated Laboratory experiments set, which will require use of simulation software and hardware equipment. Later, the course will introduce a basic definition, concepts, and design of digital logic circuits such as DTL, TTL. ECL, MOS & CMOS etc.

IV. Intended learning outcomes (ILOs) of the course:

- Brief summary of the knowledge or skill the course is intended to develop:
  1. Demonstrate knowledge of developed characteristics, operations, fundamental laws and analysis, and engineering applications related to electronic circuits and systems.
  2. Define principles of design including elements, processes and/or systems related to electronic program.
  3. Solve electronics systems using appropriate methods and modeling techniques.
  4. Analyze the electronics engineering in the field of industrial products.
  5. Employ the international standards and technical specifications of analog electronics components while designing and integrating electronic systems.
  6. Conduct laboratory experiments safely to verify theoretical concepts related to electronics components and devices.
  7. Assess personal commitment to electronics engineering tasks and effectively manage time and resources.

V. Course Content:

A – Theoretical Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours

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1.	BJT Frequency response	• General Frequency Consideration. • Types of Coupling.	1st	2
2.	BJT Frequency response	• R-C Circuits. • Logarithms and Decibel Concepts. • Low Frequency analysis. • Bode plot	2nd	2
3.	FET Frequency analysis	• Low Frequency Analysis. • Bode Plot.	3rd	2
4.	BJT and FET Frequency Response	• Miller Effect. • Input & output Miller Capacitances. • High Frequency Analysis.	4th	2
5.	Power amplifiers	• Main properties and Characteristics of power amplifiers.	5th	2
6.	Power amplifiers	• Classes of Power Amplifier. • Power Efficiency. • Series-Fed Class A Power Amplifier. • Class B Power Amplifier • Power Efficiency.	6th	2
7.	Power amplifiers	• Class AB Power Amplifier. • Class C and Class D Power Amplifiers. • Main properties and utilization.	7th	2
8.	Midterm exam	• All previous topics	8th	2
9.	Analog-to digital converters (A/D)	• Successive Approximation A/D Converter. • Dual-Slop (Dual-Ramp) A/D Converter.	9th	2

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
		• Parallel A/DE Converter (Flash Adder)		
10.	Digital-to analog converters (D/A)	• D/A Converter using Binary Weighted Resistor. • D/A Converter using R-2R Resistance Ladder.	10th	2
11.	Logic circuits	• Introduction to logic circuits. • Review of Boolean Algebra. • Timing Diagrams.	11th	2
12.	Noise margin analysis Power consumption of logic gates	• Dynamic Response of Logic Gates. • Rise Time and Fall Times • Propagation Time. • Propagation Delay. • Noise immunity.	12th	2
13.	DTL & TTL circuits	• Diode Resistor OR Gate. • Diode Resistor AND Gate. • Diode Transistor Logic (DTL). • Transistor Transistor Logic (TTL).	13th	2
14.	Other types of logic circuits.	• ECL Logic Gate. • MOC & CMOS Logic Gates.	14th	2
15.	Overview	• All Topics	15th	2
16.	Final exam	• All Topics	16th	2
Number of Weeks /and Units Per Semester			**16**	**32**

B – Tutorial Aspect:

Order	Units/Topics List	Sub Topics List	Number of Weeks	Contact hours
1.	BJT Frequency response	▪ General Frequency Consideration. ▪ Types of Coupling.	1st	2

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2.	BJT Frequency response	▪ R-C Circuits. ▪ Logarithms and Decibel Concepts. ▪ Low Frequency analysis. ▪ Bode plot	2nd	2
3.	FET'S Frequency analysis	▪ Low Frequency Analysis. ▪ Bode Plot.	3rd	2
4.	BJT and FETS Frequency Response	▪ Miller Effect. ▪ Input & output Miller Capacitances. ▪ High Frequency Analysis.	4th	2
5.	Power amplifiers	▪ Main properties and Characteristics of power amplifiers.	5th	2
6.	Power amplifiers	▪ Classes of Power Amplifier. ▪ Power Efficiency. ▪ Series-Fed Class a Power Amplifier. ▪ Class B Power Amplifier ▪ Power Efficiency.	6th	2
7.	Power amplifiers	▪ Class AB Power Amplifier. ▪ Class C and Class D Power Amplifiers. ▪ Main properties and utilization.	7th	2
8.	Midterm exam	▪ All previous topics	8th	2
9.	Analog-to digital converters (A/D)	▪ Successive Approximation A/D Converter. ▪ Dual-Slop (Dual-Ramp) A/D Converter. ▪ Parallel A/DE Converter (Flash Adder)	9th	2
10.	Digital-to analog converters (D/A)	▪ D/A Converter using Binary Weighted Resistor.	10th	2

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		▪ D/A Converter using R-2R Resistance Ladder.		
11.	Logic circuits	▪ Introduction to logic circuits. ▪ Review of Boolean Algebra. ▪ Timing Diagrams.	11th	2
12.	Noise margin analysis Power consumption of logic gates	▪ Dynamic Response of Logic Gates. ▪ Rise Time and Fall Times ▪ Propagation Time. ▪ Propagation Delay. ▪ Noise immunity.	12th	2
13.	DTL & TTL circuits	▪ Diode Resistor OR Gate. ▪ Diode Resistor AND Gate. ▪ Diode Transistor Logic (DTL). ▪ Transistor Transistor Logic (TTL).	13th	2
14.	Other types of logic circuits.	▪ ECL Logic Gate. ▪ MOC & CMOS Logic Gates.	14th	2
15.	Overview	▪ All Topics	15th	2
16.	Final exam	▪ All Topics	16th	2
Number of Weeks /and Units Per Semester			**16**	**32**

C – Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks	Contact hours
1.	BJT – Frequency response	1st	2
2.	FET – Frequency response	2nd	2
3.	BJT and FET's Frequency response	3rd	2
4.	BJT and FET's Frequency response	4th	2
5.	Series-Fed Class a Power amplifier. Input power, output power and power efficiency	5th	2

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     Ahmed Al-Shakiri   Mohammad Algorafi   AL-Bukhaiti   Assoc. Prof. Dr. Huda Al-Emad

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6.	Class B power Amplifier, input power, output power and power efficiency	6th	2
7.	Class AB Power Amplifier	7th	2
8.	Class C and Class D Power Amplifiers	8th	2
9.	Analog-to- Digital Converters (A/D) & Digital-to-Analog Converters (D/A)	9th	2
10.	Determination of Dynamic Characteristics of Logic Circuits Determination of Margin Time of Logic Circuits	10th	2
11.	DRL & DTL (Input & Output Measurement) Rise- Time and Fall-Time Logic Circuits	11th	2
12.	Design of TTL & ECL Logic Circuits Design of MOS & CMOS Logic Circuits	12th	2
13.	Final Hand-Work or Project	13th	2
14.	Review	14th	2
15.	Final Practical Exam	15th	2
Number of Weeks /and Units Per Semester		**15**	**30**

VI. Teaching strategies of the course:

- Lectures.
- Tutorials.
- Laboratory.
- Seminar.
- Interactive class discussion.

VII. Assignments:

No	Assignments	Aligned CILOs (symbols)	Week Due	Mark
1.	BJT & FET (Low frequency response).	a1, a2, b1, c1, c2	3th & 4th	4
2.	BJT & FET	a1, a2, b1, c1, c2	5th & 6th	4

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No.				
	(High frequency response).			
3.	Series Fed class A power amplifier	a1, a2, b1, b2, c1, c2, d1	8th & 9th	4
4.	Class B power amplifier. Class AB, C, D	a1, a2, b1, b2, c1, c2, d1	10th & 11th	4
5.	Logic Circuits	a1, a2, b1, b2, c1, c2, d1	12th & 13th	4
Total				**20**

VIII. Schedule of Assessment Tasks for Students During the Semester:

No.	Assessment Method	Week Due	Mark	Proportion of Final Assessment
1.	Assignments& Homework	3rd to 13th	20	10%
2.	Lab work and experiments reports	4th to 13th	20	10%
3.	Practical Term-Project and Presentation	3rd to 14th	20	10%
4.	Mid-Term Exam (Theoretically)	8th	20	10%
5.	Final-Term Exam (Practically)	15th	20	10%
6.	Final-Term Exam (Theoretically)	16th	100	50%
Total Assessments Mark/Percentage			**200**	**100%**

IX. Learning Resources:

Written in the following order: (Author - Year of publication – Title – Edition – Place of publication – Publisher).

1- Required Textbook(s) (maximum two).

1. Robert L. Boylestad, Louis Nashelsky, 2013, Electronic Devices and Circuit Theory, Prentice Hall, 11th Edition.
2. Thomas L. Floyd, 2012, Electronic devices, 9th Ed, USA, Pearson Prentice Hall.

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2- Essential References.
1. Robert T. Paynter, 2006, Introductory to Electronic Devices and Circuits, Printice Hall.
2. J. Millman & A. Garbel -1978 - "Microelectronics", McGraw Hill.
3. S. H. Grove – 1997 - "Semiconductor physics and devices", John Wiley.
4. Sedra & K. Smith – 1998 - "Microelectronic Circuits", Holt, Rinehart and Winston.
5. Richard C. Jaeger and Travis N. Blalock – 2011 – Microelectronic – 1 NIC circuit Design – 4/Edition – McGraw Hill Companies, USA – New York.
3- Electronic Materials and Web Sites *etc*.
1. http://www.ocw.mit.edu/courses.
2. https://www.youtube.com/playlist?list=PLww54WQ2wa5rOJ7FcXxi-CMNgmpybv7ei
3. Lectures will be prepared by lecturer.
4. Faculty Electronic Library.

X.	Course Policies:
1.	**Class Attendance:** A student should attend not less than 75 % of total hours of the subject; otherwise he will not be able to take the exam and will be considered as exam failure. If the student is absent due to illness, he/she should bring an approved statement from university Clinic
2.	**Tardy:** For late in attending the class, the student will be initially notified. If he repeated lateness in attending class he will be considered as absent.
3.	**Exam Attendance/Punctuality:** A student should attend the exam on time. He is Permitted to attend an exam half one hour from exam beginning, after that he/she will not be permitted to take the exam and he/she will be considered as absent in exam-
4.	**Assignments & Projects:** The assignment is given to the students after each chapter; the student has to submit all the assignments for checking on time-
5.	**Cheating:**

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	For cheating in exam, a student will be considered as failure. In case the cheating is repeated three times during his/her study the student will be disengaged from the Faculty-
6.	**Plagiarism**: Plagiarism is the attending of a student the exam of a course instead of another student. If the examination committee proved a plagiarism of a student, he will be disengaged from the Faculty. The final disengagement of the student from the Faculty should be confirmed from the Student Council Affair of the university.
7.	**Other policies:** - Mobile phones are not allowed to use during a class lecture. It must be closed, otherwise the student will be asked to leave the lecture room - Mobile phones are not allowed in class during the examination. Lecture notes and assignments my given directly to students using soft or hard copy

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